

Wax-Actuated Heat Switch for Mars Surface Applications

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Abstract. Missions to the surface of Mars pose unique thermal control challenges to rover and lander systems. With diurnal temperature changes greater than 100 oC, the presence of a Mars atmosphere, and limited power for night time heating the thermal control engineer is faced with a fundamental problem: how to successfully keep components above their survival or operating temperatures at night while managing higher environmental temperatures and dissipation rates during the day. Payload and avionics elements, among others, must be well insulated to survive night conditions at the risk of overheating during the day. This problem will be magnified in future missions as higher demand on electrical components will result in increased dissipations. One solution is a heat switch that changes thermal conductance to reject excess heat during the day and conserve heat during the night.